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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/667,949

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David K. Umberger

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HEWLETT-PACKARD COMPANY

Intellectual Property Administration

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EXAMINER

MASKULINSKI, MICHAEL C

ART UNIT

PAPER NUMBER

2113

DATE MAILED: 06/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/667,949	Applicant(s) UMBERGER ET AL.	
	Examiner Michael C. Maskulinski	Art Unit 2113	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>11/26/03; 9/22/03</u> . | 6) <input type="checkbox"/> Other: _____ |

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Non-Final Office Action***Double Patenting***

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2. Claims 1, 3, 4, 11, 13, 15, 16, are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 3, 4, and 6 of U.S. Patent No. 6,647,514 B1. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following.

Claim(s) 1, 3, 4, and 6 of patent no. 6,647,514 B1 contain(s) every element of claim(s) 1, 3, 4, 11, 13, 15, 16 of the instant application and as such anticipate(s) claim(s) 1, 3, 4, 11, 13, 15, 16 of the instant application.

“A later patent claim is not patentably distinct from an earlier patent claim if the later claim is obvious over, or **anticipated by**, the earlier claim. *In re Longi*, 759 F.2d at

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896, 225 USPQ at 651 (affirming a holding of obviousness-type double patenting because the claims at issue were obvious over claims in four prior art patents); In re Berg, 140 F.3d at 1437, 46 USPQ2d at 1233 (Fed. Cir. 1998) (affirming a holding of obviousness-type double patenting where a patent application claim to a genus is anticipated by a patent claim to a species within that genus). “ ELI LILLY AND COMPANY v BARR LABORATORIES, INC., United States Court of Appeals for the Federal Circuit, ON PETITION FOR REHEARING EN BANC (DECIDED: May 30, 2001).

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 15-20, and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Jones, U.S. Patent 5,680,539.

Referring to claim 15, in column 4, lines 30-35, Jones discloses that during non-idle periods, a Host Queue Depth Monitor executing in conjunction with the Rebuild Task monitors the current host command queue depth generated by the host and increases or decreases a Desired Rebuild Queue Depth variable accordingly (a priority identifier to determine whether host input/output (I/O) requests or rebuild I/O requests for a storage array are to have priority). Further, in column 4, lines 43-49, Jones discloses that the Rebuild Task examines the Desired Rebuild Queue Depth variable

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and compares this variable with the actual rebuild queue depth. If the actual rebuild queue depth differs from the Desired Rebuild Queue Depth, the Rebuild Task submits additional rebuild requests until the rebuild queue depth equals or is a desired proportion of the Desired Rebuild Queue Depth (and a request dispatcher, communicatively coupled to the priority identifier, to select host I/O requests and rebuild I/O requests for execution based at least in part on whether host I/O requests or rebuild I/O requests are to have priority).

Referring to claim 16, in column 6, lines 34-35, Jones discloses a disk array (wherein the storage array comprises a redundant array of independent disks (RAID) system).

Referring to claim 17, in column 4, lines 27-31, Jones discloses a host command queue (a request queue structure into which the rebuild I/O requests and the host I/O requests are placed to await selection for execution by the request dispatcher).

Referring to claim 18, in column 7, lines 41-44, Jones discloses that both the host and the Rebuild Task place requests into the execution queue for execution by the disk controller (wherein the request dispatcher is configured to select requests from the top of the queue structure regardless of whether the requests are host I/O requests or rebuild I/O requests).

Referring to claim 19, in column 4, lines 30-35, Jones discloses that during non-idle periods, a Host Queue Depth Monitor executing in conjunction with the Rebuild Task monitors the current host command queue depth generated by the host and increases or decreases a Desired Rebuild Queue Depth variable accordingly (a queue

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controller, communicatively coupled to the request queue structure, configured to order requests in the queue structure so that host I/O requests are higher than rebuild requests only if host I/O requests are to have priority).

Referring to claim 20, in column 9, lines 34-38, Jones discloses multi-level queues (wherein the request queue structure includes a plurality of queues).

Referring to claim 23, in column 7, lines 48-49, Jones discloses that the Rebuild Task dynamically compensates for the host command queue depth during the rebuild process (a request processor, communicatively coupled to the request dispatcher, to process I/O requests and preempt a host I/O request in favor of a rebuild I/O request).

5. Claims 15 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Thompson et al., U.S. Patent 5,822,584.

Referring to claim 15:

a. In the Abstract, Thompson et al. disclose that the present invention allows a user to select the drive array subsystem's priority in processing system requests versus rebuild requests (a priority identifier to determine whether host input/output (I/O) requests or rebuild I/O requests for a storage array are to have priority).

b. In column 16, lines 59-67 continued in column 17, lines 1-11, Thompson et al. disclose a REBUILD_PRIORITY. This parameter is used by the computer to rebuild the array. A "0" places rebuild operations at the lowest priority, whereas, a "255" places rebuild operations at the highest priority (a request dispatcher, communicatively coupled to the priority identifier, to select host I/O

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requests and rebuild I/O requests for execution based at least in part on whether host I/O requests or rebuild requests are to have priority).

Referring to claim 21, in the Abstract, Thompson et al. disclose a mass storage drive array subsystem of a computer system (a plurality of resources). Further, in column 17, lines 9-11, Thompson et al. disclose that when REBUILD_PRIORITY is "255," the foreground task is delayed after every processed command list for a duration of 1.6 seconds, thereby allowing the rebuild operations of the present invention to have the highest priority (wherein the request dispatcher is to limit the host I/O request usage of at least one of the plurality of resources if rebuild I/O requests are to have priority).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-4 and 6-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carbonneau et al., U.S. Patent 5,835,700, and further in view of Jones, U.S. Patent 5,680,539.

Referring to claims 1 and 11, in column 17, lines 30-35, Carbonneau et al. disclose that if one drive fails, the remaining non-failed drives can continue to supply user-desired information, although perhaps at a degraded performance rate. If yet

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another disk drive fails in the RAID 0 or RAID 5 configuration, it will no longer be possible to rebuild the lost information (identifying that a storage array is close to permanently losing data). However, Carbonneau et al. don't explicitly disclose giving, in response to identifying that the storage array is close to permanently losing data, input/output (I/O) requests for rebuilding at least a portion of the storage array priority over host I/O requests. In column 4, lines 30-35, Jones discloses that during non-idle periods, a Host Queue Depth Monitor executing in conjunction with the Rebuild Task monitors the current host command queue depth generated by the host and increases or decreases a Desired Rebuild Queue Depth variable accordingly. It would have been obvious to one of ordinary skill at the time of the invention to include the prioritization of rebuild requests of Jones into the system of Carbonneau. A person of ordinary skill in the art would have been motivated to make the modification because Carbonneau et al. disclose in column 17, lines 35-38, that when a first failure occurs, it is desirable to bring the failed drive back into an operational mode as soon as possible in order to minimize the danger of permanent data loss. Thus, Carbonneau et al. teach an explicit need to rebuild the array as soon as possible, and Jones satisfies this need by prioritizing rebuild requests and additionally provides the rebuild requests in such a way that the array performance is not degraded.

Referring to claims 2 and 12, in column 17, lines 30-35, Carbonneau et al. disclose that if one drive fails, the remaining non-failed drives can continue to supply user-desired information, although perhaps at a degraded performance rate. If yet another disk drive fails in the RAID 0 or RAID 5 configuration, it will no longer be

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possible to rebuild the lost information (wherein the identifying comprises identifying that the storage array is close to permanently losing data when failure of one additional storage device of a plurality of storage devices in the storage array would result in permanent data loss in the storage array).

Referring to claim 3, in column 2, lines 52-55, Carbonneau et al. disclose a SCSI-coupled RAID bank (wherein the storage array comprises a redundant array of independent disks (RAID) system).

Referring to claim 4, in column 17, lines 11-16, Carbonneau et al. disclose that if there are only 3 drives in the RAID bank and one drive is failing, the CMAC board might switch the configuration from RAID level-5 to RAID level-0 providing there is enough free storage space to support the switch without loss of data (the RAID system includes a plurality of RAID levels; the identifying comprises identifying when at least one of the plurality of RAID levels is close to permanently losing data). Further, in column 17, lines 30-35, Carbonneau et al. disclose giving, rebuild I/O requests priority over host I/O requests only for the at least one RAID level that is close to permanently losing data.

Referring to claim 6, in column 4, lines 31-42, Jones teaches giving host I/O requests priority over rebuild I/O requests if the storage array is not close to permanently losing data.

Referring to claim 7, in column 7, lines 41-43, Jones discloses that both the host and the Rebuild Task place requests into the execution queue for execution by the disk controller (placing both I/O requests for rebuilding at least the portion of the array and host I/O requests into a queue in the order they are received; and processing the I/O

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requests for rebuilding and the host I/O requests from the queue in a first-in-first-out (FIFO) manner).

Referring to claims 8 and 13, in column 4, lines 30-35, Jones discloses that during non-idle periods, a Host Queue Depth Monitor executing in conjunction with the Rebuild Task monitors the current host command queue depth generated by the host and increases or decreases a Desired Rebuild Queue Depth variable accordingly (allocating, among a plurality of resources in the storage array and a corresponding controller, more resource usage to the I/O requests for rebuilding than to the host I/O requests).

Referring to claim 9, in column 9, lines 38-46, Jones discloses that the disk controller includes a first queue referred to as queue 1, which is a relatively deep queue, and a second intermediate queue referred to as queue 2, which is a relatively shallow queue. As shown, host requests are provided to queue 1 and ultimately filter down to queue 2 before execution. In contrast, the Rebuild Task provides rebuild requests directly to queue 2 (preempting a host I/O request in favor of a rebuild I/O request).

Referring to claims 10 and 14, in column 1, lines 58-67 continued in column 2, lines 1-25, Jones discloses different RAID levels and the number of disks necessary to implement each level. It is inherent to a RAID system how many failed disks in the storage array can be endured without permanently losing data varies based at least in part on a particular redundant array of independent disks (RAID) architecture level of the storage array.

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8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Carbonneau et al., U.S. Patent 5,835,700 and Jones, U.S. Patent 5,680,539 as applied to claim 4 and further in view of Chen et al., RAID: High-Performance, Reliable Secondary Storage.

Referring to claim 5, in column 1, lines 58-67 continued in column 2, lines 1-25, Jones discloses RAID levels 0-5. However, Jones doesn't explicitly disclose RAID level 6. On page 155, section 3.2.7, Chen et al. disclose RAID level 6. It would have been obvious to one of ordinary skill at the time of the invention to include the RAID level 6 of Chen et al. into the combined system of Carbonneau et al. and Jones. A person of ordinary skill in the art would have been motivated to make the modification because RAID level 6 provides stronger error correcting codes for applications with more stringent reliability requirements (see Chen et al.: page 155, section 3.2.7).

9. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jones, U.S. Patent 5,680,539, and further in view of Carbonneau et al., U.S. Patent 5,835,700.
22.

Referring to claim 22, in column 4, lines 27-42, Jones discloses prioritizing rebuild requests according to a priority identifier. However, Jones doesn't explicitly disclose that the priority identifier is to determine that rebuild I/O requests are to have priority if failure of one additional storage device of a plurality of storage devices in the storage array would result in data loss in the storage array. In column 17, lines 35-38, Carbonneau et al. disclose that when a first failure occurs, it is desirable to bring the failed drive back into an operational mode as possible. It would have been obvious to

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one of ordinary skill at the time of the invention to include the prioritizing of Carbonneau et al. into the queue system of Jones. A person of ordinary skill in the art would have been motivated to make the modification because giving priority to rebuild requests according to Carbonneau reduces the risk of permanent data loss (see Carbonneau et al.: column 7, lines 33-38).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael C. Maskulinski whose telephone number is (571) 272-3649. The examiner can normally be reached on Monday-Friday 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert W. Beausoliel can be reached on (571) 272-3645. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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A handwritten signature in black ink, reading "Michael Maskulinski". The signature is written in a cursive style with a large, stylized initial "M".

Michael C Maskulinski
Examiner
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